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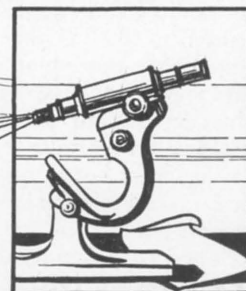
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FARM & HOME SCIENCE



PUBLISHED QUARTERLY BY THE UTAH AGRICULTURAL EXPERIMENT STATION

Volume 7

March 1946

Number 1

Utah Fertilizer Recommendations for 1946

Supplies of Fertilizers Greater Than in 1945 but not Adequate to Meet Increased Demands

By D. W. THORNE and H. B. PETERSON

THE USE of fertilizer in Utah has increased rapidly during the past 10 years. Although this expanded fertilizer usage has been accompanied by a better knowledge of desirable fertilizer practices there are still many instances in which improper fertilizer use has damaged crops or has failed to give best returns. The following fertilizer recommendations are given to help those who have not worked out satisfactory practices for their farms. Because of great differences in soils and in soil management practices it is impossible to give any general recommendations that apply to all conditions. In some instances fertilizer needs may be greater than those listed; in a few cases elements other than nitrogen and phosphorus may be required; but under average conditions the practices listed should give satisfactory results.

Supply Outlook for 1946

The fertilizer supply should be somewhat better for 1946 than it was for 1945. This is especially true of nitrogen fertilizers. It is probable, however, that there will be a definite shortage of fertilizers in Utah for early spring applications. Some fertilizer distributors now have orders exceeding their supplies anticipated before next summer.

During the past year the principal fertilizer developments in Utah in-

Dr. Thorne is associate professor and Dr. Peterson assistant professor of Soils. These recommendations have been worked out in cooperation with a committee of specialists of the Station and the State Department of Agriculture.

cluded a rapidly expanding demand for the concentrated ammonium phosphate fertilizers, 11-48-0 and 16-20-0. The year also marked the appearance on local markets of a single superphosphate (0-18-0) produced at Pocatello, Idaho. In addition there were notable improvements in the physical properties of certain fertilizers. This was especially true of ammonium nitrate which now rates as one of the best buys among nitrogen fertilizers.

Farmers should place fertilizer orders immediately for the year's supplies. It is probable that most farmers will have to substitute some fertilizer with which they are not familiar for the brand they usually purchase. To assist in such substitutions the following suggestions are offered:

Types of Fertilizer

Nitrogen Fertilizers:

Ammonium sulfate: This is the most common nitrogen fertilizer used in Utah. It contains about 20 to 21 percent of nitrogen (20-0-0). The average selling price is about \$2.45 per hundred giving a nitrogen cost of about 12 cents per pound.

Sodium nitrate: A good nitrogen fertilizer shipped into Utah. It contains about 16 percent of nitrogen (16-0-0) and sells for about \$2.65 per hundred. This gives an average cost of about 16.5 cents per pound of nitrogen which is the highest cost of any of the inorganic nitrogen fertilizers. Sodium nitrate is a readily available source of nitrogen, but because of the sodium content it should not be used in large quantities

on lower, poorly drained lands that are already subject to alkali troubles. In following fertilizer recommendations apply 125 lbs. of sodium nitrate for each 100 lbs. of ammonium sulfate.

Ammonium nitrate: A good nitrogen fertilizer produced largely in synthetic nitrogen factories built for the manufacture of explosives. The pure product contains from 31 to 34 percent nitrogen (32-0-0) and sells for about \$4.00 a hundred. This gives an average cost of about 12 cents per pound of nitrogen which compares very favorably with the cost of ammonium sulfate. With its present excellent physical condition ammonium nitrate is definitely a best buy in nitrogen fertilizers. Apply about 65 lbs. for each recommended 100 lbs. 20-0-0.

Phosphate Fertilizers:

Treble superphosphate: In the past this has been the most commonly used phosphate fertilizer in the Intermountain States. For this reason most of the fertilizer recommendations are based on the use of this product. It contains 43 percent available phosphoric acid (0-43-0). At an average cost of about \$2.60 per hundred each pound of available phosphoric acid is worth about six cents.

Single superphosphate: During the past few years considerable single superphosphate containing 20 percent available phosphoric acid (0-20-0) has been distributed by the AAA. The Simplot Company at Pocatello is producing an 18 percent grade (0-18-0) which has sold for \$1.50 a hundred. This gives

(Continued on page 9)

The Department of Poultry Husbandry

WORK in poultry husbandry at Utah State was started during the school year of 1895-96 by James Dryden. The first Experiment Station bulletin giving results of research work on poultry and egg production was published in 1897 (Utah Station Bul. 51). Since that time, many station bulletins and circulars have been published by this department and numerous special articles on various phases of poultry raising have been prepared for scientific and farm journals.

The poultry industry in Utah has developed very rapidly during the past 25 years. Before 1920 a considerable volume of both poultry and eggs was imported into the state to supply local demands. From 1920 to 1930, census data show that egg production in Utah increased approximately 120 percent, a greater increase than in any other state. Production since 1930 has continued to grow but not at this same rate. Turkey production in Utah has increased rapidly since 1936. Approximately two million turkeys were produced in 1945. Utah has ranked sixth among the states in number of turkeys raised the past three years. The poultry industry has grown in importance from year to year until it is now one of the leading agricultural industries of the state, when measured in terms of the total value of poultry and eggs produced.

This development has led to the extension of the Poultry Department in all three of its divisions—research, extension, and teaching.

The research work has been centered on the important economic production problems of breeding, feeding and management. Results obtained from these studies show that mixtures of locally produced barley, wheat, and alfalfa meal, when supplemented with necessary minerals, vitamins, and proteins, gives results equally good in rate of growth, liveability, and egg production as similar feed mixtures where all or part of the barley is replaced with yellow corn and generally at a considerable saving in feed cost. Comparatively low protein (20 to 21 percent) starting rations and (18 to 19 percent) growing and laying rations have shown results equal to rations containing higher levels of protein and at a saving in feed cost.

Data have also been obtained which show that turkeys fed a growing or developing mash supplying only about 19 percent total crude protein and from 25 to 35 percent (by weight) of a good grade of alfalfa meal from the time

they are 8 weeks old until ready for market at 29 weeks are as well fleshed and finished as turkeys receiving rations containing higher levels of protein and containing as little as 10 percent alfalfa meal. In these studies feed consumed per pound of gain is practically the same but feed costs are less under Utah conditions with the lower protein and higher alfalfa meal mash.

The extension program reaches into every county in the state and covers all phases of the industry. In recent years a major project has been the supervision of the National Poultry and Turkey Improvement Plans, including testing for pullorum disease. Breeders, hatchers, and producers have been assisted in developing birds that grow faster, produce more and better quality

Professor Byron Alder has been head of the Poultry Department since 1913. For the first fourteen years he was the only member of the department, carrying on the teaching, research, and extension work. His research work on the use of home products in poultry feeds has saved the poultry industry of the state many thousands of dollars. He early showed that oyster shells, then generally used for grit, could be replaced by home produced limestone, and that home grown feeds were much cheaper and equally as nutritious as imported feeds (upper right)

Dr. Carl Frischknecht joined the Poultry Department in 1930. He is now an associate professor and spends most of his time with the Extension Service, being state supervisor of the National Poultry Improvement Plan, the National Turkey Improvement Plan, and the Utah Pullorum Disease Control Law. Dr. Frischknecht received his Ph.D. from the University of Maryland in 1945 (lower left)

Dr. C. I. Draper graduated from Utah State in 1939 and received his Ph.D. degree from Iowa State College in 1942 in poultry nutrition. Since then he has spent two years at Washington State and a year and a half as head of the Poultry Department of the University of Hawaii. He came to Utah State as associate professor a year ago (lower right)

eggs, and that are more immune to certain diseases.

This educational work is carried on through short courses at the college and out in the counties by tours, special meetings, farm visits, correspondence, and distribution of circulars, bulletins, special leaflets and blueprints.

Courses in poultry husbandry offered to students to meet the requirements for a B. S. degree include general poultry husbandry, poultry production, poultry management, feeds and feeding, incubation and brooding, breeds and breeding, turkey production, special poultry practice, and poultry diseases. These courses are designed to meet the needs of students wishing to gain employment in most branches of the poultry industry. To aid in the teaching of poultry husbandry, the poultry department maintains a flock of several different breeds of chickens and turkeys. These and well equipped laboratories enable the students to gain instruction and practice in many of the practical problems of poultry husbandry.



The Economic Situation as It Relates to Utah's Agriculture

Farmers May Look Forward to 1946 As Another Profitable Year

By W. PRESTON THOMAS

The General Agricultural Outlook for 1946

IN SPITE of economic uncertainties, Utah farmers may look forward to 1946 as another favorable year for agricultural prices and income. The high level of demand for agricultural products will be supported by relatively high incomes of industrial workers, large wartime savings, removal of most wartime restrictions, some tax reduction, and by greatly enlarged foreign and relief shipments of food to European and Asiatic countries. Farm prices in 1946 may be slightly under the 1945 level, but they are expected to be sufficiently high to assure a relatively good net farm income.

Although the general level of prices for agricultural products for 1946 may be favorable, there is likely to be a wider variation in prices received for the various agricultural commodities than was received during the war period when controls were in force.

During the immediate postwar period the chances are favorable for increased prices. The present pressure for consumptive goods and the immense amount of money now available or the large purchasing power of the consumers may result in more inflation and an increase in prices of both agricultural and non-agricultural commodities.

It is apparent that this is a period for Utah farmers to proceed with their business in a cautious manner by planning a program on a short-time basis. It is a time to take advantage of the relatively favorable price level for agricultural products without making long-time commitments or major adjustments. The immediate future is the time to produce, to sell, and to pay off indebtedness or save the profits for a more opportune time to improve the farm plant.

Dr. Thomas is head of the Department of Agricultural Economics and an authority on agricultural prices.

for March 1946

Prices Received by Utah Farmers
World Wars I and II
1935-39 = 100

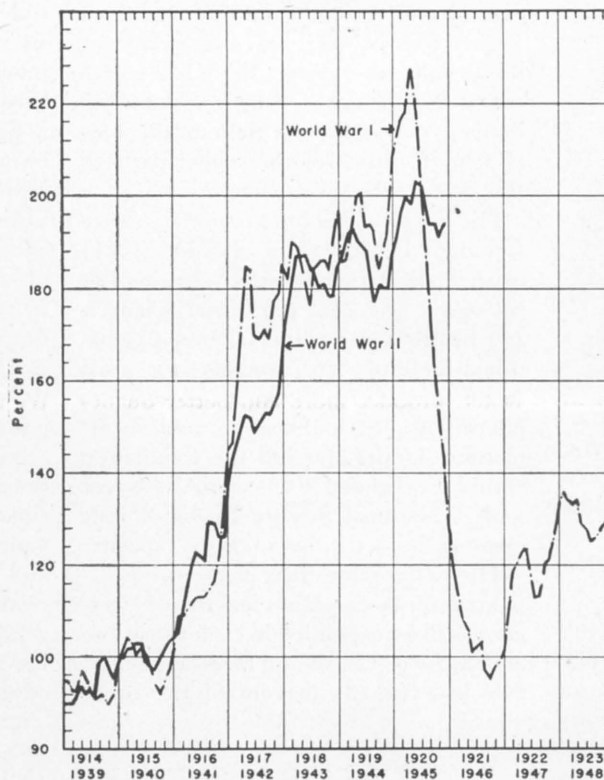


Fig. 1. During World War II farm prices in Utah have followed the same pattern as during World War I

Utah Farm Prices

During World War II, or from 1939 to 1945, farm prices in Utah have followed the same pattern as during World War I, or for the period 1914 to 1918 (fig. 1 and table 1). From September 1914, when World War I began, to November 1918 at the close of the war, Utah farm prices increased 102 percent. Utah farm prices also increased 102 percent for the period from October 1939 to the close of the war with Japan in 1945.

In November 1918, the index of Utah farm prices was 184, and a year later, in 1919, it was 188. However, by May 1920, farm prices had increased to an index of 228, or an increase of 128 percent from 1914. It was during this inflationary period from 1919 to 1920 that farmers and other groups concluded that this high level of prices was normal. At such inflated prices, farming was profitable and there developed a greatly expanded demand for land, with the result that land values and

farm indebtedness in Utah greatly increased. However, these greatly inflated values did not last long, for by 1921, when agriculture and industry thought prices had been stabilized at a desirable level, they suddenly declined, with agricultural prices dropping faster and going lower than the prices of industrial commodities or industrial wages. Farm prices in Utah dropped from an index of 228 in May 1920 to 95 in October 1921, a decline of 58 percent in eighteen months.

In 1921 Utah farmers were dazed by the suddenness and the amount of the drop in farm prices. They had become accustomed to rising prices and increased land values.

The present situation is favorable for more inflation. During the war, world production of civilian goods was greatly curtailed. Goods are still scarce and the present production is only about nine percent above pre-war, as compared to 40 percent increased production of total goods during the war period.

The American consumers now have more available money or purchasing power to buy the few available goods than at any other time in our history. It is estimated that there is in the United States over 200 billion dollars in bank deposits and other liquid assets available for immediate purchase of civilian goods and supplies.

The situation for the immediate future is favorable for higher prices, especially for non-agricultural goods. Agricultural products will be more plentiful than non-agricultural commodities. If there is considerably more inflation and the general price level rises, farm prices are likely to go higher and land values will increase. On the other hand, if sufficient consumer goods become available to meet the demands and price controls are wisely applied, the danger of price inflation may be greatly reduced.

(Continued on page 11)

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NATIONAL SCIENCE FOUNDATION

THE importance of research not only to insure the national defense, but to combat illness and disease, to create new products and new processes, to increase production of food, fiber, and other consumer goods has been impressed upon Americans by the war.

The atomic bomb, radar, our superior bombing and fighting planes, penicillin, atribrine, and many other discoveries of our research laboratories were primary factors in our successful prosecution of the war. In fact, scientific research is playing such an important part in our present day life that thinking people are coming to believe that such an important instrument of national welfare should be a major concern of government. In the future, noncommercial type research whether for basic or applied science should not have to rely as in the past on private philanthropy.

The national government has been interested in certain phases of research practically since its foundation. An increasingly important function of the Department of Agriculture has been its research program to aid in solving the problems of the American farmer. The state agricultural experiment stations established in connection with the land grant colleges have worked with the Department of Agriculture in the furtherance of agricultural research.

The importance of a more extended interest in research on the part of the federal government led President Roosevelt to appoint a committee with Dr. Vannevar Bush as chairman to explore the feasibility of a national research project and to suggest its scope. This report was published some two years ago

and recommended that public funds be used to create a widespread wealth of skills, ideas, and facilities as an investment in national prosperity and peace. It was so favorably received that a number of bills have come before Congress to put the recommendations of the report into effect and establish a national science foundation. The most recent of these bills is Senate Bill 1720 introduced by Senators Kilgore, Johnson, Pepper, Fulbright and Saltonstall. Only a brief outline of the salient parts of this bill can be given here.

The bill provides for a national science foundation with eight divisions: (1) mathematical and physical sciences, (2) biological sciences, (3) social sciences, (4) health and medical science, (5) national defense, (6) engineering and technology, (7) scientific personnel and education, (8) publication and information. Under this bill the foundation would be headed by an administrator with a National Science Board of nine members to act in an advisory capacity.

The bill provides that of the funds expended for research not less than 15 percent shall be expended in each of national defense or health and medical science. Not less than 25 percent of the funds

shall be appropriated to the states as follows: two-fifths in equal shares, and the remainder in proportion to population. The amount to each state shall be used only for carrying on research in tax supported colleges and universities. Each institution is to be given the widest latitude in choice of research projects. An additional 25 percent is to be expended in non-profit organizations without regard to state quotas.

Scholarships and fellowships are to be awarded to persons selected on the basis of aptitude for scientific study at institutions of higher learnings. The administrator shall maintain a register of scientific and technical personnel and in other ways provide a central clearing house of such information.

The activities of the science foundation shall not curtail nor limit the activities of other government agencies.

Such a foundation should give additional emphasis to research in the fundamental sciences which is basic to advances in agriculture, home economic and related fields and will tend to correlate research in all fields for the public good. Such legislation should receive the support of all those interested in the advancement of agriculture.

LADYBIRD BEETLE MISTAKEN FOR PEST

By GEORGE F. KNOWLTON

STRIPED ladybird beetles have often been mistaken for injurious pests. Approximately one pint of adult striped ladybird beetles, *Ceratomegilla vittigera* (Mann.), were found in one place on main street at Beaver, April 23, 1938 (fig. 1). The beetles had congregated and were thought to have hibernated in the dense growth of tall orchard grass near a service station. Fearing these beetles to be insect pests, rather than recognizing them as beneficial ladybird beetles, the finders saved only a small bottle of specimens; the remaining masses of beetles were splashed with kerosene and burned.

At various times this ladybird beetle feeds on the pea aphid, potato aphid, mealy plum aphids, and other injurious plant lice under field conditions. One male striped ladybird beetle was seen feeding on a winged pea aphid in a pea field at Benson, in Cache County.

This beetle was brought into the laboratory and caged; it ate 90 fourth-instar and adult pea aphids during the next 18 days. Sixteen pea aphids were eaten by it in one day.



Adult striped ladybird beetle

A farmer at Manti found large congregations of these striped ladybird beetles and brought a boxful of them to the county agent on January 5, 1946. The farmer stated that there were millions of these in ditch-banks of his field. Apparently this gregarious species is less commonly recognized by farmers as a beneficial ladybird than are most of the other ladybird beetle species, so commonly encountered in aphid infested pea and alfalfa fields, and among aphids on trees, shrubs and various garden plants. It is unfortunate that the striped ladybird has at various times been mistaken for the striped cucumber beetle, banded flea beetle, and for other injurious insect pests.



Dr. Wilcox (right) and Miss Maughan (left) making ascorbic acid determinations

RETENTION OF ASCORBIC ACID IN CABBAGE SALAD

By ETHELWYN B. WILCOX
and ALICE MAUGHAN

EVERY alert homemaker knows the importance of planning a well-balanced diet for her family. The food must then be selected and prepared carefully to insure a high vitamin content when it reaches the table. As the housewife has no equipment to check the vitamin content of the food she serves, she must depend upon the research laboratory to determine what happens to the vitamin content of the food under different methods of preparation.

An experiment designed to show what happens to the ascorbic acid or vitamin C in the preparation of cabbage salad was planned and conducted in the nutrition laboratory at the Utah Agricultural Experiment Station. Cabbage, which is raised on a commercial scale in Utah, is one of our best vegetable sources of ascorbic acid and is an easily available salad vegetable at a relatively low cost to the housewife. For these reasons an investigation was made on the effect of the ascorbic acid content of cabbage cut by two different methods and then allowed to stand at room temperature and also in the refrigerator for various intervals of time, with and without salad dressing.

Dr. Wilcox is associate professor of nutrition and Miss Maughan is a senior student in nutrition who has assisted with the cabbage analyses.

Experimental

Danish Ball Head cabbage as grown for commercial distribution by the Utah Celery Growers' Cooperative Association was obtained for this study. Sufficient cabbage for the entire experiment covering a period of 15 days was purchased at one time and stored untrimmed until used. Prior to the time that the cabbage was brought to the laboratory for use, each sack was covered with moistened burlap and kept at a temperature just above freezing. In the laboratory the untrimmed heads of cabbage were wrapped in heavy waxed paper and placed in a refrigerator until used. Each set of analyses required 4 to 6 heads of cabbage. These were shredded on a hand kraut shredder or chopped for 15 seconds in an electric food chopper in the U.S.A.C. cafeteria. Similar portions of each head were used for chopping and for shredding. Determinations of ascorbic acid were made on the shredded cabbage before being mixed with the salad dressing (equal parts cooked salad dressing plus whipped cream) as follows: (1) within one minute after the heads of cabbage were cut, and (2) six minutes later when the entire amount had been shredded. A portion of each lot with and without dressing was covered with a moist cloth and held in the refrigerator for 1½

hours. The remainder of each lot was held at room temperature for a like period of time and analyzed at half hour intervals during a 1½ hour period. A similar set of determinations was made on the chopped cabbage. Each set of analyses was repeated 10 times.

Results

The freshly cut cabbage contained 50.4 mg. ascorbic acid per 100 gm. (see table 1). There was a loss of approximately 10 percent during the 6 minutes required for shredding. This finding is in line with results reported by other investigators. An additional loss of 4.2 percent in shredded and 8.1 percent in chopped cabbage occurred during the 8 to 12 minutes required to mix part of each lot with salad dressing. At this time the shredded cabbage contained 43.4 mg. and the chopped cabbage 40.8 mg. ascorbic acid per 100 gm. When the data for the shredded cabbage with dressing were calculated on the dry basis, the ascorbic acid values were 35.3 to 41.7 percent below the values without dressing. Chopped cabbage showed similar values (31.5 to 34.5 percent).

The moisture content of the cabbage held without dressing showed little variation during the holding time (0.2 to 0.3 percent). No loss of moisture occurred in cabbage to which dressing had been added.

Holding the cabbage at room temperature in an uncovered bowl or in the refrigerator in a covered container made no marked difference in the ascorbic acid content. However, the uncovered cabbage held at room temperature without dressing became wilted before the end of the hour and a half while the cabbage with the dressing had an off flavor. The quality and flavor of the cabbage with and without dressing covered with a damp cloth and held in the refrigerator was much superior to the cabbage held at room temperature.

If it becomes necessary for the housewife to keep cut cabbage for a short period of time, this latter method of holding is to be preferred.

Serving cabbage cut in wedges without dressing, which is gaining favor in many homes, would insure maximum ascorbic acid values. The amount of ascorbic acid from cabbage which would thus be added to the diet would compare favorably with the amount of this vitamin in a medium small orange (45-65 mg. per 100gm.).

(Continued on page 11)



SOME BEE PLANTS OF UTAH

By GEORGE H. VANSSELL

UTAH has long been an important honey-producing state. Bees were brought in by the first settlers, and the early state emblem portrayed a bee skep in a conspicuous position. A brief informal discussion of the honey plants of this state may therefore be pertinent.

Honey production depends primarily upon the secretion of nectar by plants. This secretion, however, is an extremely variable factor, by no means assured by the presence of blossoms. The sugar concentration of the nectar is also variable, depending largely upon its position in the blossom and its consequent exposures to moist or dry air. A study of plant nectars in the Pacific coast region has revealed a sugar content ranging from 5 to 60 percent. Some nectars are colorless; others are tinged with yellow or brown. The original nectar color determines the color of the more concentrated honey.

Though honey is an important source of income to the beekeeper, the bees' most important function is the transfer of pollen from plant to plant. Without

George H. Vansell, apiculturist of the U. S. Bureau of Entomology and Plant Quarantine, is located at the Pacific States Bee Culture Laboratory at Davis, California. Mr. Vansell has spent considerable time in Utah studying wild bees and honeybees in relation to alfalfa seed setting.

such transfer many plants fail to set fruit or seed. All varieties of sweet cherries and almonds must be cross-pollinated to set a crop. Many plums, apples, and some pear and peach varieties also require insect transfer of pollen. Alfalfa, red clover, white clover, onions and carrot blossoms, being almost wholly self-sterile, call for insect visitation if commercial crops of seed are to be produced. Fortunately, a number of plants that require cross-pollination also secrete sufficient nectar to constitute a commercial source of honey. In this way honey production provides the incentive for beekeeping and pays the costs of pollination.

Not only must bees have nectar for their honey stores and food, but they also collect pollen and store it away to provide the proteins, fat, and vitamins necessary for reproduction and for growth of the young. Thus it is seen that bees are entirely dependent upon the plants, and vice versa.

In the Western States the following 12 plants can be considered as major sources of honey:

- Alfalfa (*Medicago sativa* L.)
- Cuttclaw (*Acacia* spp.)
- Clover (*Trifolium* spp.)
- Fireweed (*Epilobium angustifolium* L.)

Bee colony used for pollination in plum orchard

- Cotton (*Gossypium* sp.)
- Hairy vetch (*Vicia villosa* Roth)
- Mesquite (*Prosopis* spp.)
- Orange (*Citrus* spp.)
- Sages (*Salvia* spp.)
- Sweetclover (*Melilotus* spp.)
- Yellow star-thistle (*Centaurea solstitialis* L.)
- Wild buckwheat (*Eriogonum* sp.)

Alfalfa, the leading honey plant, is grown extensively for hay and for seed production. Delta, Cedar City, Uinta Basin, and Cache Valley are important sections for the production of alfalfa honey. When allowed to blossom freely, it secretes much nectar. Deep in each blossom are two pitlike nectaries, which secrete nectar from a few hours after the petals unfold until pollination occurs or the blossom withers. An unfertilized blossom will secrete for about a week. The pollen in an alfalfa blossom is enclosed in a sheath, which must be opened to release it. This process, known as tripping, is accomplished by various insects with some difficulty. Among honeybees most of the tripping is done by the pollen collectors. Alfalfa pollen bee loads are of a brownish tinge when fresh, but they fade to pale yellow in the course of a few days. Alfalfa is not a preferred source of pollen to the honeybee except when more easily worked and more productive blossoms are scarce.

There are about one-half million acres of alfalfa in Utah. The fields of alfalfa

NEW PUBLICATION

Bul. 320. Soil erosion in small irrigation furrows, by O. W. Israelsen, G. D. Clyde, and C. W. Lauritzen. Department of Irrigation in cooperation with U. S. Soil Conservation Service. 39 p.

This bulletin reports data collected in a three year study of the effect of irrigation furrow slopes and size of streams on the amounts of soil eroded from the furrows. The weight of water-free soil eroded in one hour from 200-foot furrows ranged from only a few pounds in a furrow of less than 1 percent slope to more than 1800 pounds in a furrow of 6 percent slope.

This publication may be obtained free by addressing a card to the Utah Agricultural Experiment Station, giving number and series.

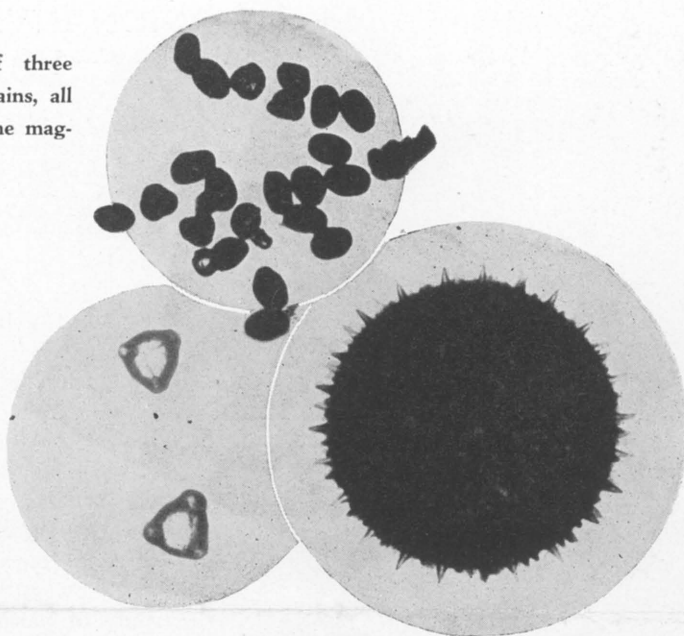
grown for seed are the most productive of nectar because of the numerous blossoms and the longer period of bloom. When an alfalfa field is cut for hay, about a month elapses before it again begins to blossom. The average sugar concentration of alfalfa nectar has been found to be 40 percent. In a wet field the concentration is less, while under drier conditions the nectar concentration exceeds the average. This is another reason why the seed fields provide a better honey crop.

The sweetclovers, both white and yellow, are good sources of nectar. Sweetclover occurs beside irrigation ditches, along roadsides, and in numerous other situations where sufficient moisture is available. It is also used to some extent in irrigated pastures. Yellow sweetclover is more productive of pollen than white. Large loads of bright yellow pollen come from the yellow sweetclover while the white provides small loads of a grayish color. The honey from this source is water white and has a fine flavor. The average sugar concentration found in the white sweetclover nectar has been about 35 percent.

White Dutch, alsike, and ladino clovers are also very attractive to the bees. In some of the Northeastern States clover is the chief source of honey, but in Utah it is too limited to rank as a leader.

Among the other nectar sources in the state, the deciduous fruits should be mentioned. Apples, cherries, apricots, and peaches all provide some

Photomicrographs of three kinds of pollen grains, all taken with the same magnification



honey Pears are not so important for this purpose as for pollen. All the deciduous fruits blossom so early that the bee colonies are not yet strong enough for storing honey. The chief value of all the fruit blossoms is in providing early nectar and an abundant supply of pollen for building up the colonies from their weakened condition due to the rigors of winter.

Numerous minor sources of honey or pollen found in Utah are the following:

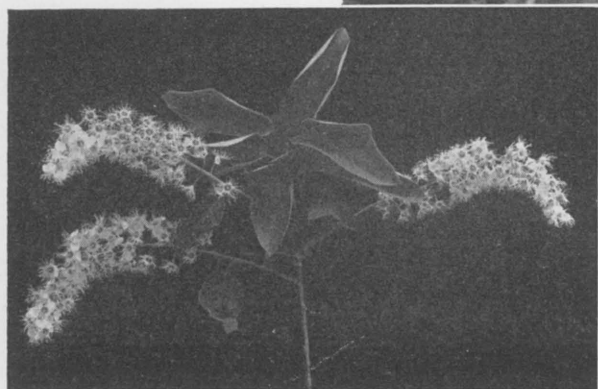
Arrowweed (*Pluchea sericea* Cov.)
Balsam root (*Balsamorhiza* spp.)
Basswood (*Tilia* spp.)
Black locust (*Robinia pseudo-acacia* L.)
Catnip (*Nepeta cataria* L.)

Chicory (*Cichorium intybus* L.)
Chokecherry (*Prunus* spp.)
Cleome (*Cleome serrulata* Pursh.)
Dandelion (*Taraxacum palustre* var. *vulgare* (Lum.) Fernald)
Elder (*Sambucus* spp.)
Filaree (*Erodium* sp.)
Hoarhound (*Marrubium vulgare* L.)
Houndstongue (*Cynoglossum officinale* L.)
Manzanita (*Arctostaphylos* spp.)
Matchweed (*Gutierrezia sarothrae* Britt. and Rusby.)
Mesquite (*Prosopis glandulosa* Torr.)
Mustard (Genera: *Brassica* spp. and *Sisymbrium* sp.)
Poppy (*Eschscholtzia* spp.)
Salsify (*Scorzonera* spp.)
Wild currant (*Ribes* spp.)
Will geranium (*Geranium* spp.)

Some of these appear only locally in the southern part of the state, while others occur rather generally wherever moisture is sufficient for growth and reproduction. Sagebrush (*Artemisia* spp.) and greasewood (*Sarcobatus vermiculatus* (Hook.) Torr.) are not honey plants, but they both provide pollen.

A fuller discussion of the bee plants of Utah must await further field study. The subject is important enough to warrant a comprehensive publication in the future. Beekeeping has suffered a serious decline in Utah, and, along with the beemen, other dependent groups have suffered losses.

Dr. Wayne Binns, research assistant professor of veterinary science, has returned to the campus after 3½ years in the military service.



Balsam root (above) and chokecherry (left) both sources of pollen for bees

ONION INVESTIGATION AT THE UTAH STATION

By L. H. POLLARD

Dr. Pollard is head of the Vegetable Crops Department. He came to the college in 1939 after taking his Ph.D. at the University of California. Dr. Pollard is continuing experimental work in onion breeding begun by Dr. A. L. Wilson who died in 1938.

THE onion research program at the Station has been planned to aid the onion growers as well as to help in the establishment of new producing areas in the state. In general, the program has consisted in the testing of onion varieties and strains in several sections of the state, the improvement of the Sweet Spanish lines, the use of male sterile lines in the production of Sweet Spanish type hybrids, the study of various methods of harvesting and storage on the keeping quality, and fairly extensive studies on onion seed production. Experiments have been conducted in both southern and northern Utah.

The Washington County area has annually had a small acreage of bunch onions as well as bulb onions. Although it may not be desirable to expand the acreage of bunch onions in that section

at the present time, the outlook for an increase of bulb onions appears favorable. Until recently, many of the growers had attempted to produce the Sweet Spanish variety. While fairly heavy yields were occasionally obtained, in general, this variety did not produce the yield or quality of bulb that is normally required for successful commercial production.

In the trials conducted at Hurricane in 1941 and 1942, the yellow variety, San Joaquin, and the white variety, Crystal Grano, outyielded all of the other varieties tested. Both have an attractive globe-shaped bulb. Growers began producing the San Joaquin in small commercial quantities in 1942 and since that time its production has increased as rapidly as seed could be obtained. In another year, approximately one hundred acres will be planted to the San Joaquin variety. The Crystal Grano has been slower in its commercial development because of lack of seed. Enough seed should be grown in 1946 for a small acreage and it is probable that there will be sufficient seed produced in 1947 for one hundred acres or more.

Growers of bunch onions in Washington County have been producing the Crystal Wax variety but they are not

Fig. 1 (top) Topping onions in the row before pulling. Fig. 2 (center) Picking up onions after the bulbs have been topped in the row and lifted with a cultivator. Fig. 3 (bottom) White Sweet Spanish onion bulbs stored in shallow crates

Fig. 4. Group of certified onion seed growers and officials at meeting in Farmington, 1945



too well pleased with it because of its early bolting habit. The Crystal Grano appears to be an excellent variety for bunching and may well replace the Crystal Wax for that purpose. The new bunching variety, Beltsville, which was released recently by the U. S. Department of Agriculture has looked promising in all of the experimental tests. The seed supply will be increased as rapidly as possible and by 1947 some commercial plantings will be made.

In the variety trials in northern Utah the local Yellow Sweet Spanish and White Sweet Spanish strains are being tested along with the strains released by the Utah Station. Many of the strains showed considerable variability and some were badly mixed. The Station strains of both the Yellow and White Sweet Spanish were superior to all of the others in trueness to type, and in the case of the latter, in yield also.

A breeding program to develop the best strains of both the Yellow and White Sweet Spanish is already under way. Among the objectives are: strains with better keeping quality, the development of a good early strain of each variety, and the improvement of the appearance and yielding ability of both varieties. By selecting and inbreeding the better plants it has been possible to eliminate a high percentage of the undesirable types such as thick-necks, doubles, and splits. The resulting lines are being rapidly increased.

It is now the plan of the Station to produce from 300 to 500 pounds of seed of both the White and Yellow Sweet Spanish varieties each year. This seed will be used by the growers as foundation stock for the production of certified seed of these varieties. As new strains or varieties are developed, they will be handled in a similar manner.

Another method of improvement is the development of hybrid strains of the Sweet Spanish type. This method offers greater opportunity than any other in the improvement of existing varieties. It has been made practicable by the establishment of male-sterile lines by Dr. H. A. Jones of the U. S. Department of Agriculture. By using the male sterile plants it is easy to make hybrids with the better Sweet Spanish lines. As a result of this work, it should be possible to develop the variety that is wanted. Seed for small commercial plantings will probably be available in 1947 or 1948.

There are many conflicting opinions as to the best method of harvesting onions. The general practice has been to pull the onions and leave them in the windrow for a day or two or even a week before the tops are removed. Experimental work has shown that this is not necessary, for onions which are topped, immediately are equal in keeping quality to the others. Less loss of weight has also been found the first few weeks after harvesting for those bulbs topped immediately. A still newer method is to top the onions before harvesting. The tops are slashed off at the neck with a sharp knife and the bulbs are then lifted with a cultivator. Such a method has been in use on the Station farm at Farmington for the last three years and has resulted in reducing the cost of harvesting to about one third of what it was formerly.

The storage of onions has always been a problem in Utah, at least with the White Sweet Spanish variety. There has often been a loss of 76 percent or more. Preliminary studies were started last fall to determine if storage losses could be lessened. It was decided to decrease the size of storage crate and to increase the circulation of air. The crates were made half the size of cantaloupe crates and when filled hold 25 to 30 pounds of onions. Lug ends were used to which were nailed two 2-inch cantaloupe crate slats on the side and five on the bottom. Increased ventilation was obtained by using two fans which force air under the stacks seven minutes every half hour. The rows of stacks were spaced two inches apart. The bulbs appeared to be keeping well on February 1 of this year.

The above studies will no doubt greatly aid the onion industry in Utah. Some of the problems of storage and harvesting methods will require several years for solution, whereas the breeding program should be continued indefinitely if this state is to compete with other producing areas.

FERTILIZER RECOMMENDATION

(Continued from page 1)

an average cost of 8.3 cents per pound of available phosphoric acid which is about 30 percent above the cost of phosphate in the treble superphosphate. The single superphosphate contains almost 50 percent by weight of gypsum but this probably has no economic value on most normal farm soils in Utah. Apply about

200 to 250 lbs. of 0-18-0 for each 100 lbs. of 0-43-0.

Ground rock phosphate: Each year some ground rock phosphate is produced in the state or shipped in. Do not buy this product. Experiments with this material have failed to show any value from its use in states of the arid West. Money invested in ground rock phosphate for a fertilizer is money thrown away.

Mixed Fertilizers:

There will probably be a rather large variety of mixed fertilizers in the state. In some of them the price is far out of line. Others may cost less than similar quantities of plant nutrients purchased in the single carriers listed above. In general, however, the cost per pound of plant nutrients is more in mixed fertilizers than in single carriers because of the cost of mixing. In buying mixed fertilizers select a combination of plant nutrients to meet the needs of your soils and crops and then estimate the relative cost per pound of plant food of each product that meets your need.

The guaranteed analysis on a bag of mixed fertilizer is made up of three figures such as 5-15-10. The meaning of these symbols is as follows:

5 means 5 percent total nitrogen.

15 means 15 percent available phosphoric acid (P_2O_5)

10 means 10 percent water-soluble potash (K_2O).

The following equivalent mixtures will be helpful in making substitutions in the fertilizer recommendations:

100 lbs. 11-48-0 is about equivalent to 200 lbs. of 6-30-0.

100 lbs. 6-30-0 is about equivalent to 175 lbs. of 4-16-0.

100 lbs. 16-20-0 can be substituted for 100 lbs. 10-20-0 to give a little more nitrogen per acre.

100 lbs. 10-20-0 is equivalent to 200 lbs. of 5-10-0.

A 6-30-0 fertilizer can be made by mixing 30 lbs. of ammonium sulfate and 70 lbs. of treble superphosphate.

A 10-20-0 fertilizer can be approximated by mixing equal weights of ammonium sulfate and treble superphosphate.

Since no need for potash has been established for Utah soils, is recommended that farmers do not buy fertilizers containing potash except for experimental purposes. Thus a 4-16-4 fertilizer should be considered as having no greater value than a 4-16-0 fertilizer for most Utah farms.

(Continued on page 11)

RECOMMENDED FERTILIZER PRACTICES FOR 1946

Crop	No farm manure and light colored soils		Farm manure applied		Suggested practices
	Fertilizer	Lbs./Acre	Fertilizer	Lbs./Acre	
Sugar beets	11-48-0 0-43-0 20-0-0	150 or 150 and 100 (Side dressing)	0-43-0 0-18-0 0-43-0	150 or 300	Apply fertilizer, broadcast and harrow into seedbed just before planting. If seed drill with fertilizer attachment is available, drill about 75 lbs. of 0-43-0 per acre. If fertilizer is dropped with seed, do not use any nitrogen in fertilizer drill. Side dressing of ammonium sulfate should be applied before first irrigation with a cultivator fertilizer drill attachment.
Alfalfa and clovers	0-43-0 0-18-0	200 or 450	0-43-0* 0-18-0	200 or 450	New plantings: Apply phosphate fertilizer with plow attachment, or broadcast on seedbed and harrow in just before planting. Old stands: Apply fertilizer broadcast on soil in early spring and harrow into soil; or, drill into soil with grain drill having a fertilizer attachment.
Irrigated pastures	16-20-0 10-20-0	300 or 300	0-43-0 0-18-0	200 or 400	New plantings: Apply fertilizer, broadcast and harrow into seedbed just before planting. Old pastures: Apply fertilizer, broadcast in early spring. Apply phosphate every third year. To encourage early grass growth apply 200 lbs. 20-0-0 per acre in early spring. Nitrogen fertilizer applications in midsummer will improve late pasture. Manure applied in early spring benefits grass throughout summer.
Sugar beet seed (Washington County)	20-0-0 0-43-0	400 and 300	20-0-0 0-43-0	300 and 250	Apply 150 to 200 lbs. 0-43-0 by broadcasting and harrowing into seedbed before planting. Fifty pounds may be drilled with seed.
(Northern valleys)	20-0-0 0-43-0	300 and 200	20-0-0 0-43-0	200 and 250	Apply 100 lbs. 20-0-0 as a side dressing in fall as soon as beets are large enough, and apply 100 to 300 lbs. as a side dressing in spring. Less nitrogen is needed where manure is applied.
Vegetable seeds					
Annual	16-20-0 10-20-0	300 or 300	0-43-0	200	Apply broadcast and harrow into seedbed, or drill to side of row at planting time. If cultivator fertilizer attachment is available, the fertilizer can be applied at second cultivation.
Biennial	16-20-0 10-20-0	400 or 400	0-43-0 20-0-0	200 and 100	Apply phosphate in fall before seeding. Side dress with 20-0-0 the following spring. On unmanured land half of fertilizer should be applied in spring as side dressing.
Beans, dried Beans, snap Beans, lima Carrots Potatoes Tomatoes Peas	6-30-0 11-48-0	250 or 150	0-43-0	150	It is generally preferable to apply the fertilizer with an attachment to the planter at seeding time, or side dress the plants about the time of the second cultivation. If equipment is not available, broadcast fertilizer and harrow into seedbed just before planting.
Cabbage	16-20-0	300	0-43-0	150	As above
Onions	6-30-0 11-48-0	300 or 200	6-30-0	150	As above
Sweet corn	16-20-0	200	0-43-0	150	As above
Lettuce	10-20-0	300	6-30-0	150	As above
Wide-spaced celery	10-20-0	200	0-43-0	150	As above
Close-spaced celery	16-20-0 20-0-0	300 and 400	0-43-0 20-0-0	200 and 400	Apply 16-20-0 or 0-43-0 broadcast and harrow into seedbed just before planting. Side dress with 20-0-0, 100 lbs. per acre at three different times at two-week intervals, beginning about August 1 in northern Utah. A hand-pushed drill such as a Planit Junior can be used if larger equipment is not available.
Berries	20-0-0	300	0-20-0	100	Apply to sides of rows on established stands of berries.
Peaches, apricots pears, plums, prunes sour cherries Apples, sweet cherries	20-0-0 16-20-0 20-0-0 16-20-0	lbs. per tree 3 or 4 5 or 6	None 16-20-0 None 16-20-0	lbs. per tree None or 2 None or 3	Apply fertilizer at early blossom stage by broadcasting and disking into soil or drilling in bands between rows. For trees that are not mature, proportionately smaller applications should be made.

*Row crops usually respond better to farm manure than legume hay crops; it is, therefore, recommended that manure be put on row crops where the supply is limited.

Methods of Fertilizer Application

In the past most fertilizers used in Utah have been applied broadcast and harrowed into the soil surface. It is more efficient and economical to place the fertilizer in bands near the plant row with some type of drill. Fertilizer placement with a drill has the following advantages over broadcast applications: (1) The fertilizer is placed in the proper position for plant roots to feed on it easily; (2) One hundred pounds of fertilizer drilled to the side of rows often increases yields as much as 200 lbs. applied broadcast; (3) Fertilizer placed in bands does not come in as intimate contact with the soil and hence remains in soluble forms longer than broadcast fertilizer.

The coming year will probably find a large number of fertilizer drills on the market. For the average farmer a cultivator type of fertilizer distributing attachment is probably the most practicable. Such an attachment can usually be shifted easily from one piece of equipment to another and can be used on a number of crops. Be sure that the quantity of fertilizer applied by equipment purchased can be varied to amounts low enough for the concentrated fertilizers used in this area.

President F. S. Harris is on leave of absence from the college to head an agricultural mission of three men who have been sent by the U. S. State Department to the Near East to assist in solving agricultural problems in these countries. The other members of the mission are Dr. R. E. Buchanan, director of the Iowa Agricultural Experiment Station, and Dr. Alef Tannous, authority on the Near East for the U. S. Department of Agriculture.

The mission is traveling by air to Beirut, Lebanon, which will be their headquarters. They will travel from there to Syria, Arabia, Iraq, and other near eastern countries by car.

This is the fourth mission of President Harris to Asia and the Near East. In 1926 he went to Japan, China, the Philippines, Malaya, India, and Egypt. In 1928 he headed a mission to Russia in the interests of Jewish immigration, and in 1939-40 he served as agricultural adviser to the Persian government.

Dr. L. A. Stoddart, formerly head of the Range Management Department of this Station, and author of many articles in Farm and Home Science, is now head of the Range Management Department of the Texas A. & M. College.

Dr. Stoddart has been at the Utah Station since 1935. He is the author of a text on range management, and a number of Station bulletins, and of many articles appearing in technical periodicals. No one has been appointed to take his place, although his classes are being taught by John McDonald who is on leave from the U. S. Forest Service.

Professor D. W. Pittman has sailed for China where he will be technical advisor to a Chinese company in the setting up of a sugar beet industry. The manager of this company is Dr. Walter Ching, a former student at Utah State who recently completed the work for his Ph.D. degree at Cornell University. Professor Pittman will direct the planting, cultivation, and harvesting of about 10,000 acres of sugar beets and will remain in China until after the beets are harvested in the fall.

Milton A. Madsen, assistant professor of animal husbandry, has returned after serving three and one-half years in the army.

Experimental tests have shown DDT effective in controlling lygus bugs in sugar-beet seed fields and thrips in onion seed fields. Insect pests have greatly reduced the yields and viability of both these seed crops in the state. Tests over the past three years with various insecticides have shown DDT to be the most effective insecticide used for the control of lygus and thrips. These studies, along with control recommendations, will be reported more fully in a later number of Farm and Home Science.

Dr. Ethelwyn B. Wilcox has just returned from a conference of scientists engaged in nutritional research held in Chicago.

RETENTION OF ASCORBIC ACID

(Continued from page 5)

ACKNOWLEDGMENT: The authors wish to express their appreciation to Una Vermillion, director of the U. S. A. C. cafeteria, for her cooperation and interest in this problem.

Table 1. Ascorbic acid in cabbage

Holding time		Ascorbic acid					
		Shredded cabbage		Chopped cabbage			
Place	Time	Moist basis*	Moist basis†	Dry basis‡	Moist basis*	Moist basis†	Dry basis‡
<i>Freshly cut heads</i>							
			150.4 ± 1.11	525.0	.....	.....	.....
<i>Freshly shredded or chopped</i>							
			45.3 ± 1.15	471.9	.....	44.4 ± 1.14	444.0
<i>Without dressing</i>							
Room temperature	None	.....	43.4 ± 0.85	452.1	.....	40.8 ± 1.46	408.0
	1/2 hr.	.....	43.9 ± 0.72	452.6	.....	41.5 ± 1.34	410.9
	1 hr.	.....	44.8 ± 1.31	457.1	.....	41.6 ± 1.50	409.9
Refrigerator	1 1/2 hr.	.....	46.9 ± 1.44	473.7	.....	41.9 ± 1.67	410.8
	1 1/2 hr.	.....	45.5 ± 1.29	454.1	.....	41.5 ± 1.51	415.0
<i>With dressing</i>							
Room temperature	None	31.7	41.7 ± 0.81	292.5	29.9	38.5 ± 0.90	279.6
	1/2 hr.	31.1	40.9 ± 0.64	286.0	29.6	38.0 ± 0.87	277.3
	1 hr.	30.3	40.2 ± 0.99	278.2	30.0	38.0 ± 1.08	280.5
Refrigerator	1 1/2 hr.	30.1	39.8 ± 0.59	276.1	28.7	36.4 ± 0.84	269.1
	1 1/2 hr.	30.7	40.6 ± 0.64	285.8	29.6	37.7 ± 1.03	277.2

*Ascorbic acid content of 100 gm. of sample (cabbage plus dressing).

†Ascorbic acid content of 100 gm. of cabbage.

‡Standard error, according to Snedecor.

ECONOMIC SITUATION

(Continued from page 3)

The degree of inflation or the amount of increase in prices in the immediate future will largely determine the economic position of farmers in the long postwar period and the amount of adjustments they will be forced to

make. The next few years will be a difficult period for the farmer to keep his business in an economic position whereby adjustments can be easily made.

Table 1. Index of Utah farm prices during World Wars I and II (1935-39=100)

Utah farm price	Index during	
	World War I	World War II
	percent	percent
Index at beginning of war	92	99
Index at end of war	184	202
Index one year after end of war	188	?
Index 1 1/2 years after end of war	228	?
Index three years after end of war	98	?

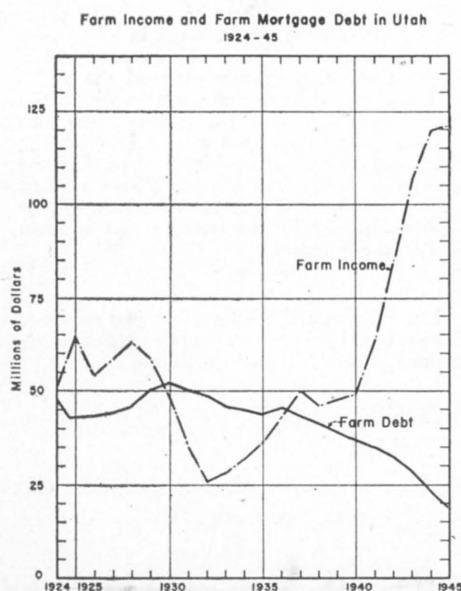


Fig. 2. The yearly cash farm income in Utah has varied from 26 million dollars in 1932 to 121 million in 1945

Utah Farm Income and Farm Indebtedness

The yearly cash farm income in Utah has varied from 26 million dollars in 1932 to 121 million dollars in 1945 (fig. 2). Previous to the depression of the 1930's, Utah's cash farm income averaged about 58 million dollars per year, as compared to about 31 million dollars per year during the low five years of depression in the 1930's. Utah farm income for 1945 increased 152 percent over the income for 1939.

The increased income during the war period resulted from increase in both farm prices and production. The major factor, however, was price.

Utah farm mortgage debt decreased from 52 million dollars in 1930 to 19 million dollars in 1945. Utah mortgage debt declined 51 percent from 1939 to 1945.

During World War I, Utah farmers increased the farm indebtedness, while during World War II, or from 1939 to 1945, the debt was materially decreased (fig. 2). At the present time, the farm mortgage debt in Utah is relatively low, and farmers of the state are in an excellent financial position to make adjustments in case it becomes necessary when prices decline during the postwar period. However, if land values continue to increase, the trend in reduced farm indebtedness is not likely to continue.

Land Values

From 1914 to 1918, during World War I, land values in Utah increased 24 percent, but by 1920 they had increased 70 percent (fig. 3 and table 2). From 1918 to 1920, the two years following the war, farm real estate values in Utah advanced 37 percent.

During World War II, land values followed prices of agricultural commodities in the same pattern as during World War I. In November 1945, the index of land values in Utah was 141, or 39 percent above the values in 1939. When data are available on land values for 1946, they undoubtedly will show a considerable increase over the 1945 values.

If land can be purchased and paid for from profits or savings, or if the farmer purchases a small acreage to round out his farming unit, then the buying of land at high values is not a serious problem. Difficulties usually arise, however, when farms are purchased at values too high and a large indebtedness is assumed, most of which must be paid over a long period. Such obligations or indebtedness will likely have to be paid during periods of lower farm prices or with a deflated dollar.

An Economic Program for Farmers

This is a period for farmers to take advantage of high prices, pay off indebtedness, and save funds to be used to develop and reorganize the physical features of the farm plant when materials are available and when they may be obtained at lower costs.

For efficient production and in order to meet future competition, the physical features of Utah's farms need reorganization. To do this will require the blocking up of the farm into one unit, changing the farm layout by reducing the number of odd-shaped and non-contiguous pieces of land, the realigning of irrigation canals, and the leveling of

Table 2. Index of farm real estate values in Utah (1935-39=100)

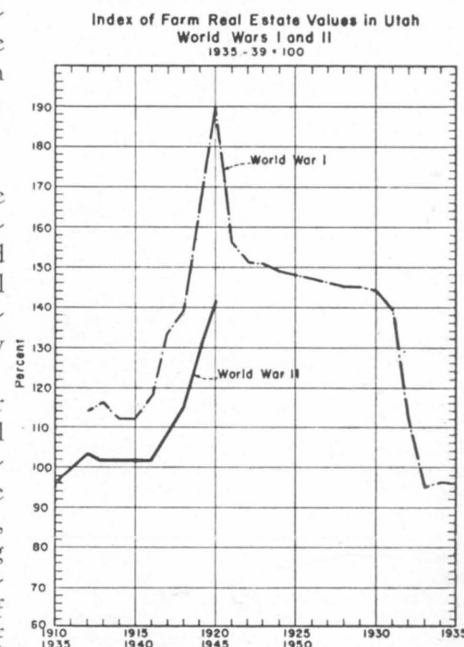
Year	Index percent
1914	112
1918	139
1920	190
1925	148
1933	95
1939	101
1945*	141

*November 1945

farm lands for more efficient irrigation. During the postwar period, Utah farmers will find it difficult to compete with farmers in other areas with large units and where new farm machinery can be used more efficiently.

To put Utah farms in a better position to compete with other areas will require capital and credit. When prices are high is the time to build up capital and improve credit rating.

Fig. 3. From 1944 to 1918 land values in Utah increased 24 percent, but by 1920 they had increased 70 percent. In November 1945 the land values were 39 percent above the values in 1939



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